

NOTES AND COMMENTS

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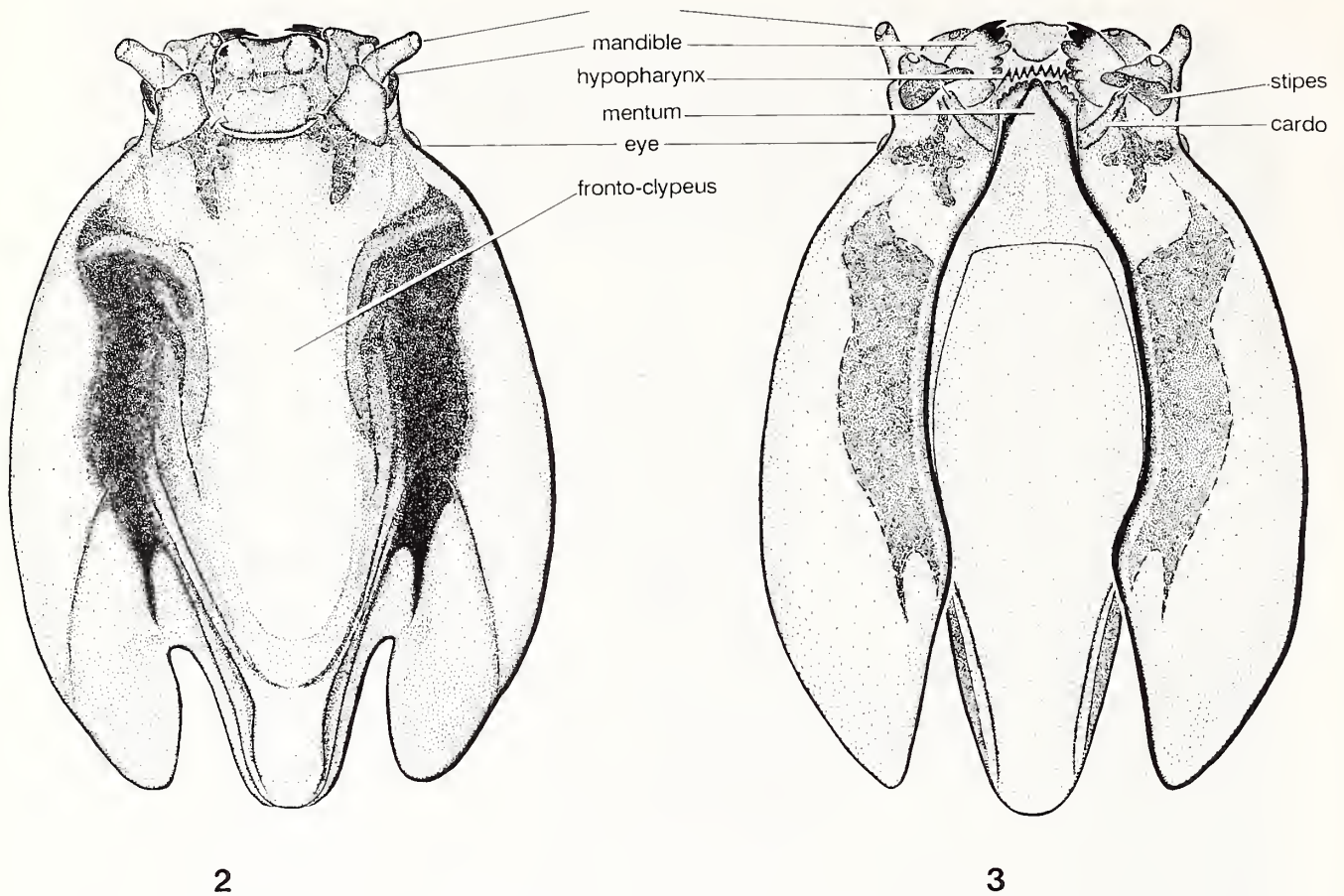
OBSERVATIONS ON THE BIZARRE JELLY MASS HABIT OF LARVAL *GERANOMYIA* (DIPTERA: TIPULIDAE: LIMONIINAE)

An unusual specimen of a larval *Geranomyia* tipulid was found at the Finca La Selva Biological Station in Heredia, Costa Rica, on 8 February, 1989. It was found while examining leaves among trees in the old coffee finca on the station property. Suspended beneath one leaf, at about 6 feet from the ground, was a globular mass about 2.5 cm in diameter, made of a clear jelly-like substance and harboring a verdent green larva (Fig. 1). The larva was obviously a mature instar nematoceran, with an evident head capsule and thickened thoracic region. Posterior spiracles barely penetrated the surface of the jelly mass, no doubt allowing the larva to respire. When disturbed, the larva rolled around in the jelly mass, even retracting the posterior spiracles. With sunlight coming through the leaf the green larva became almost invisible. It is unknown as to what the larva may have been feeding upon, how it found its way to such an inaccessible spot, and whether or not the jelly is a feature of the last (fourth) instar. The specimen, with leaf, was placed in a moist petri dish and 4 days later it emerged as a female *Geranomyia*, with intricately patterned wings typical of the genus. Being such an unusual habit for any fly, this prompted us to describe the habit and morphological modifications that the larva might have for this peculiar existence. Other references to the jelly mass habit of larval *Geranomyia* are reviewed, and possible origins of the habit are given.

The larval exuvium (with head capsule) was originally pointed on the same pin as the adult specimen, but it was then softened in KOH and slide mounted for compound microscopy. Specimens are in the AMNH. Dorsal and ventral views of the head capsule are shown in Figures 2 and 3, respectively. The rest of the larva was not examined, since the exuvium was not well preserved. The larva has a typical limoniine head capsule (Hennig, 1950), with broad lateral plates which are fused to the frontoclypeus dorsally forming a blackened, strongly sclerotized area along much of its length (ventrally the lateral plates are connected only anteriorly to form the mentum). The antennae are 2-segmented, inserted above the base of the mandibles (the typical, terminal papilla may have been lost during molting). The mandible is of the cutting-chewing type, strongly sclerotized, and with one pointed tooth at the apex and five smaller teeth along the inner margin. The maxilla possesses a sclerotized cardo and stipes (the lacinia not being well defined). Eight visible pointed teeth occur ventrally on the hypopharynx (the number dorsally was not visible). The mentum possesses 11 rather blunt teeth, the median one largest and slightly elevated. Features of the head capsule do not differ significantly with other limoniines (cf. *Geranomyia canadensis* [Alexander and Malloch, 1920], see Cramer, 1969), indicating that the diet may not be so unusual as to require distinct morphological specialization. No evidence of folivory was evident. Such a habit is very rare in tipulids, and occurs, for example, in *Limonia* (*Dicranomyia*) *kauaiensis*, which mines leaves of *Cryptandra* in



Fig. 1. Photograph of *Geranomyia* sp. fourth instar/prepupal larva in situ in jelly mass under leaf. Arrow points to posterior spiracle opening.



Figs. 2, 3. Head capsule from larval exuvium of Costa Rican *Geranomyia* female. 2. Dorsal view. 3. Ventral view.

Hawaii (Swezey, 1915). The *Geranomyia* specimen might have been grazing upon an algal film on the leaves.

The bizarre jelly mass habit of tipulids has actually been reported elsewhere, by Hingston (1932) for a specimen in British Guiana. So far, this habit is known only in *Geranomyia*. Hingston reported (p. 342): “. . . in the forest there was a crane-fly, *Geranomyia*, which suspended its pupa in a globule of jelly wrapped around the tip of Turu palm leaf. The globule was a firm gelatinous substance, rather smaller than a hazel-nut and clear as water. Indeed, its appearance was that of a large drop of water about to fall from the end of the palm leaf. . . . The pupa was clearly visible inside it. It rested in a nearly vertical position, its head upward in the broad part of the globule, its tail below and close to the leaf. Its colour was grass green with five dark bands that half-crossed its body.” The Costa Rican specimen was not found in a pendulous jelly mass the way Hingston reported (the larva in fact was parallel to the leaf surface), nor were there obvious dark bands across the body. Hingston's specimen, with others, were later described as *Limonia (Geranomyia) gelatifex* (Edwards, 1934). Alexander and Alexander (1970) indicate *G. gelatifex* to be a junior synonym of *Limonia (G.) recondita* (Alexander), 1921. They report the distribution of *recondita* to be from Guyana and Brazil to Ecuador, Peru, and Panama. The species identity of the Costa Rican female could not be determined with certainty since tipulid species are generally defined on the basis of male genitalia.

It is evident that the jelly mass is produced directly from the larva. There is no evidence that leaves exude the substance, nor even that the larva sequesters the

substance from the plant. In fact, a similar jelly substance is produced in much smaller quantities by *Limonia triocellata*. This is a broadly mycophagous species breeding in various macrofungi in the eastern United States. As the mature larvae become pharate pupae, they form mucilaginous tunnels in the fungal context or substrate below, in which they pupate. Production of the jelly substance may, in fact, be widespread in limoniines and just produced in overabundance by *Geranomyia*. *Geranomyia* pupating on such exposed surfaces as leaves would probably be highly susceptible to hymenopterous parasitoids, and the jelly mass may afford at least some concealment or physical barrier.—David Grimaldi, Department of Entomology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024-5192; and Chen Young, Section of Invertebrate Zoology, Carnegie Museum of Natural History, 4400 Forbes Avenue, Pittsburgh, Pennsylvania 15213.

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